

APPENDICES

GLOSSARY



I

impermeable - Describes a substance that liquids and gases cannot pass through. (1-2)

incinerator - An apparatus, such as a furnace, for burning waste. (2-2)

infrared - Of or relating to the range of invisible radiation from just beyond the red region of the visible spectrum to the microwave region of the spectrum. (1-1)

infrared energy - Energy in the infrared region of the electromagnetic spectrum, which comes from sunlight, incandescent lamps, resistance wires, etc. (4-3)

infrastructure - In the fuels context, the system of production, distribution and retail sale of a particular fuel. (2-4)

input - Something put into a system or expended in its operation to achieve output or a result, especially energy, work, or power used to drive a machine. (3-1)

intake stroke - The piston stroke during which the intake valve opens and the cylinder fills with an air-fuel mixture from the intake manifold. (3-2)

intangible benefits - The non-monetary benefits associated with converting a vehicle or a fleet of vehicles to an alternative fuel; such benefits may relate to the natural environment, safety, or national security. (2-4)

internal-combustion engine - A heat engine in which the combustion that generates the heat takes place inside the engine instead of in an external furnace. (3-2)

ion - An atom or group of atoms that has acquired a net electric charge by gaining or losing one or more electrons. (3-3)

irony - Incongruity between what might be expected and what actually occurs; an expression, verbal or visual, marked by a deliberate contrast between apparent and intended meaning. (2-4)

irrigate - To supply with water by artificial means. (4-3)

isotope - Any of two or more forms of an element that have the same atomic number, but different numbers of neutrons, different atomic weights, and different physical properties. (4-3)



APPENDICES

GLOSSARY

J

jet fuel - Highly refined kerosene. (2-2)

joule - The International System of Units' unit of work or energy, equal to the work done when a force of one newton acts through a distance of one meter. (2-1)

K

kerosene - A thin oil distilled from petroleum or shale oil, used as a fuel for heating and cooking, in lamps, as a denaturant for alcohol, and, in highly refined form, as jet fuel. (2-2)

kinetic energy - Energy a body has because it is in motion. It is equal to one half the product of the mass of a body and the square of its motion. (1-1)

L

landfill - A system of managing trash and garbage in which the waste is buried between layers of earth and synthetic material. (2-2)

La Niña - A climate event triggered by lower than average sea surface temperatures in the central equatorial Pacific Ocean. (4-3)

law of conservation of energy - Physical principle that the total amount of energy in a system remains constant, although energy can be changed from one form to another or transferred from one object to another. Also called the first law of thermodynamics. (1-1)

leukemia - An acute or chronic disease characterized by an abnormal increase of white blood cells. (4-4)

life cycle analysis - See *cost-benefit analysis*. (2-4)

light-duty vehicle - Automobile or truck having a gross vehicle weight of less than 8,500 pounds. (2-4, pp. 416, 417)

lignite - A soft coal with low heat content and about 40% moisture, also called brown coal. (1-2)

liquefaction - The process of making, or state of being, a liquid. (1-2)

liquefied natural gas - Natural gas that has been condensed to a liquid, typically by cooling the gas to -259°F. (2-3)

APPENDICES

GLOSSARY



liquefied petroleum gas (LPG) - Light hydrocarbons extracted from natural gas or petroleum that liquefy under moderate pressure. The term is often used interchangeably with propane. See also *butane* and *propane*. (2-3)

luminescence - The emission of light that does not derive energy from the temperature of the body and is usually a result of a chemical or biochemical reaction. (1-1)

lymphoma - Any of various tumors that arise in the lymph nodes or in the lymphoid tissue. The lymph system transports certain nutrients and cells through the body and removes bacteria and other substances. (4-4)

M

M85 - A mixture of 85% methanol and 15% unleaded gasoline by volume; used as a motor fuel for light-duty applications. (2-3)

M100 - 100% (neat) methanol, used as a motor fuel for heavy-duty engines. (2-3)

maglev (magnetic levitation) - A high-speed rail technology by which a train can travel free of friction at 300 miles per hour or more. The train is suspended on a magnetic cushion about half an inch above an elevated magnetic track, whose moving magnetic field alternately attracts and repels magnets mounted on the train, which is pushed and pulled along by this process. (1-3)

mains - Networks of small underground pipelines that distribute natural gas throughout a service area. (1-2)

marsh - Low land covered at times by water. (4-3)

mass - A property of matter related to inertia. As the mass of an object increases, so does its inertia. Mass can be thought of as the quantity of matter in an object. Mass is not the same as weight, which depends on the gravitational forces acting on an object that has mass. (1-1)

Material Safety Data Sheets - Information produced by chemical suppliers to inform the public about a chemical's composition, hazards, and safety precautions needed when using or storing it. (p. 405)

matter - Anything that occupies space and has mass. (1-1)

mechanical energy - The energy a substance or system has because of its motion (1-1)

media - In the context of communications, the means used to present news, advertisements, or other messages to an audience. The singular form is *medium*. (2-4)



APPENDICES

GLOSSARY

mesosphere - The portion of the atmosphere from about 30 to 50 miles above the earth's surface, characterized by temperatures that decrease from 10°C to -90°C. (4-1)

methane (CH₄) - The simplest hydrocarbon and the principal constituent of natural gas. Also, the principal gas derived from landfills. Pure methane has a heating value of 1,012 Btu per cubic foot. (2-1)

methanol (CH₃OH) - Also known as methyl alcohol or wood alcohol. The simplest alcohol, it is produced commercially by catalytically combining carbon monoxide (CO) with hydrogen (H₂) under high temperature and pressure or by steam-reforming natural gas. (1-2, 2-3)

methyl alcohol - See *methanol*.

methyl tertiary butyl ether - An ether manufactured by reacting methanol and isobutylene. The resulting ether has a high octane rating and low volatility. MTBE is a fuel oxygenate and is permitted in unleaded gasoline up to 15%. (2-2)

micron (μ) - The one-thousandth part of a millimeter, or the one-millionth part of a meter. (4-4)

mileage - The number of miles traveled by a motor vehicle on a given quantity of fuel. (2-4)

miles per gallon equivalent - The average number of miles a vehicle can travel on an amount of alternative fuel equal in energy content to one gallon of gasoline. (2-4)

mobile-source emissions - Emissions of pollutants from cars, trucks, buses, and other motor vehicles. This category includes both exhaust and evaporative emissions. (4-2)

molecule - The smallest particle into which a substance can be divided without changing its chemical or physical properties; a group of like or different atoms held together by chemical forces. (1-1, 2-1)

molecular formula - A chemical formula (such as C₃H₈) that shows the number and kinds of atoms in a molecule but not their arrangement. (2-1)

municipal solid waste - Residential and commercial refuse; makes up the largest source of waste in industrialized countries. (2-2)

musculoskeletal system - Interaction between the muscles and the skeleton. (4-4)

APPENDICES

GLOSSARY



N

National Propane Gas Association - The national trade association for the U.S. propane industry. Membership includes retail marketers, producers, wholesalers, and equipment suppliers. (pg. 407)

natural gas - A mixture of gaseous hydrocarbons, primarily methane, occurring naturally in the earth, used principally as a fuel in the production of heat, electricity, or in transportation. For vehicular use, natural gas is compressed in special tanks to a pressure of 2,000-3,600 psi. It can also be liquefied by cooling to -259°F. (2-2, 2-3)

natural gas liquids - A mixture of easily liquefied hydrocarbon compounds and small quantities of other substances existing as a gas or in a solution with crude oil in natural underground reservoirs. (1-2)

natural selection - The process in nature by which organisms adapt to their environment, tend to survive and to transmit their genetic characteristics. (4-3)

near-nonattainment area - A region that is close to exceeding minimum federal air-quality standards for certain pollutants. See also *nonattainment area*. (4-2)

negative terminal - The part of an electrical device, e.g., a battery, having lower electric potential, towards which current flows. (3-3)

nitrogen - A non-metallic element that occurs naturally as a colorless, odorless, diatomic gas (N_2). Nitrogen constitutes nearly 4/5 of the volume of the earth's atmosphere. (4-1)

nitrogen oxides - A group of gases including nitrogen oxide (NO) and nitrogen dioxide (NO_2), precursors to ground-level ozone. (4-1)

nonattainment area - A region that exceeds minimum federal air-quality standards for one or more pollutants. See also *Clean Air Act of 1970, criteria pollutants*. (4-2)

non-fuel energy source - A source of energy that does not directly result from combustion, such as electricity, geothermal energy, hydropower, nuclear energy, solar energy, and wind energy. (1-3)

non-renewable fuel - Fuel that takes millions of years to make, such as fossil fuels. At current rates of consumption, these sources will be depleted long before more are available for use. (1-2)

nuclear energy - The energy released when the nuclei of atoms are split or fused. (1-1, 2-2)

nuclear reactor - A device in which a fission reaction is initiated and controlled. The resulting heat is typically used for power generation and the fission products used for military and medical purposes. (2-2)



APPENDICES

GLOSSARY

O

octane rating - Also called octane number; a numerical representation of the anti-knock properties of motor fuel. (2-3)

olefins - A class of unsaturated open-chain compounds with the general formula C_nH_{2n} , e.g., ethylene, propylene. Olefins are present in gasoline and are created in an automobile engine during combustion; most of these can be removed in the catalytic converter. They encourage ozone formation and are poisonous. Olefins are desirable fuel components from the point of view of energy content. (2-3)

operating costs - The costs of using and maintaining a vehicle or appliance. (2-4)

opinion - In cartooning, the component of an editorial cartoon in which the artist expresses a personal belief about a subject. (2-4)

organic - Describes any substance containing the element carbon. Those who first isolated the carbon atom found it in molecules from living things and therefore called such molecules "organic", which means "from life." Many minerals that contain carbon, such as coal and diamonds, were formed over time from formerly living things. (2-1)

original equipment manufacturer - Manufacturer that provides the original design and materials for making a product. OEMs include the major U.S. auto manufacturers. In the context of alternative fuels, OEM refers to a manufacturer that produces a vehicle that leaves the assembly line ready to use an alternative fuel without further conversion. (2-4, p. 416)

Otto cycle - The four piston strokes (intake, compression, power, and exhaust) that make up a complete cycle in a particular type of internal-combustion engine; also called the four-stroke cycle. (3-2)

output - The energy, power, or work produced by a system. (3-1)

oxidation - The act or process of combining with oxygen. (2-1)

oxidize - To combine with oxygen at a molecular level. (4-4)

oxygen - An element that is found as a colorless, tasteless, odorless, diatomic gas (O_2) at standard temperature and pressure. Required for nearly all combustion and in the cellular processes of animals. (2-1)

oxygenate - In the context of automotive fuels, a substance containing oxygen as part of its structure that is added to a fuel to improve its combustion characteristics. Common oxygenates include ethers and alcohols. (2-2)

APPENDICES

GLOSSARY



oxygenated gasoline - Gasoline with an oxygen content of 2.7% by weight. Oxygenated fuel tends to burn more completely, converting its carbon into carbon dioxide rather than carbon monoxide. This reduces air pollution from exhaust emissions. (2-2)

ozone (O₃) - A molecule consisting of three oxygen atoms that occurs at both ground level and high in the atmosphere. It is a blue, pungent-smelling gas at room temperature. Ground-level ozone is formed naturally when water vapor reacts with lightning. It is formed in greater quantities when sunlight acts on nitrogen oxides and volatile organic compounds emitted by fuel combustion. Ozone is the principal component of the brownish haze called smog. (4-1, 4-3)

ozone layer - A layer of ozone in the stratosphere that reflects ultraviolet light back out into space. (4-1)

P

paraffins - Chemical compounds made up of a straight chain of carbon atoms. (2-3)

particulates - Small particles of polluting compounds; soot. (4-2, 4-4)

parts per million - A measurement of the concentration or density of one substance compared to another. If 50 ml of carbon monoxide is present in 1 million ml of air, the concentration of CO is 50 ppm by volume. (4-2)

passive solar - A method that places and designs buildings so that they take maximum advantage of the natural warming power of the sun. (1-3)

payload - The weight of cargo a vehicle is rated to carry. (pp. 416-419)

peat - A densely matted material formed from layers of dead vegetation in swampy areas. Peat is the first stage in coal formation and can be dried and burned as a fuel. It is about 90% water, 5% carbon, and 5% other substances. (1-2)

penstock - A gate for regulating the flow of water. (1-3)

periodic table - An arrangement of the chemical elements according to their atomic numbers and related chemical properties. (2-1)

permeable - Material that can be permeated, allowing the passage of liquids or gases. (1-2)



APPENDICES

GLOSSARY

perpetual motion - The continuous operation of a mechanical device or other closed system without a sustaining energy source. (3-1)

petroleum - See *crude oil*. (1-2)

photochemical reaction - Any chemical reaction initiated by light energy. See also *smog*. (4-2)

photovoltaic cell - Device that converts sunlight directly into electric current. (1-3)

piston - A sliding device that moves back and forth within a cylindrical vessel. (3-2)

plutonium - A naturally radioactive, silvery, metallic, element found in uranium ores and produced artificially using uranium. It is a radiological poison, and is used in nuclear reactors and in nuclear weapons. (2-2)

pollution - The contamination of soil, water, or air by the discharge of harmful substances. (4-1, 4-2)

polymer - A compound consisting of up to millions of repeated linked units, each a relatively light and simple molecule. (3-3)

porous - Describes a substance that admits the passage of gas or liquid through pores or fractures. (1-2)

positive terminal - The part of an electrical device, e.g., a battery, having higher electric potential, from which current flows. (3-3)

potential energy - Energy that is stored. To be used, potential energy must be converted into one of six forms of kinetic energy. (1-1)

pounds per square inch - A measurement of pressure. (2-4)

power stroke - The piston stroke during which both valves are closed and air-fuel mixture burns, expands, and forces the piston down to transmit power to the crankshaft. (3-2)

power system - A system that converts, transmits, and controls energy to perform useful work. A machine is a small power system. Other power systems are very large, and have many parts and end tasks. (3-1)

pressure - The application of continuous force by one body on another that it is touching. For example, atmospheric pressure is the force the earth's atmosphere exerts on the earth's surface. It is measured by calculating the force or thrust exerted on a surface divided by the surface area. (3-2)

APPENDICES

GLOSSARY



price premium - The cost an original equipment manufacturer adds to an alternative fuel vehicle to compensate for the conversion and equipment costs. (2-4)

primary energy source - A source that is naturally available to humans. (1-3)

print media - Books, magazines, and other printed publications. (2-4)

proof - In journalism, the part of an editorial in which the author supports his or her opinion with factual documentation. (2-4)

propane - (C_3H_8) Colorless, odorless gas extracted from natural gas or crude oil, used as a fuel and as a raw material in chemical manufacturing. One of the alternative fuels specified in the Energy Policy Act of 1992. Also called liquefied petroleum gas (LPG). (2-1, 2-3)

Q

question - In journalism, the part of an editorial in which the author poses a question or proposition. Editorial questions usually refer to current events or issues. (2-4)

R

radiant energy - The form of energy related to the movement of light, electromagnetic waves, or particles. (1-1)

radio wave - An electromagnetic wave within the wavelength of radio frequencies. (1-1)

radioactive decay - Spontaneous breakdown of a radioactive substance accompanied by the emission of radioactive particles. (2-2)

rapeseed - The seed of the rape plant, a European plant. Oil is extracted from the rape seed and used as a lubricant and in food products. (2-3)

reactive emissions - Compounds emitted by evaporation or combustion of fuels that react with the atmosphere to form harmful pollutants, such as ozone. Includes reactive hydrocarbons, e.g., benzene, and other compounds such as sulfur dioxide. (4-1)

reader action - The final part of an editorial in which the author requests the reader to perform a task, such as to call a member of Congress and express support for a bill. (2-4)



APPENDICES

GLOSSARY

reciprocating engine - An engine in which the to-and-fro motion of one or more pistons is transformed into the rotary motion of a crankshaft. (3-2)

recovery measures - The ways that petroleum is extracted. When a well is first drilled, it releases pressures sealed within the reservoir, which push the oil out of the well without aid. This is called primary recovery. Later, water or gas is injected above or below the oil pocket to keep it going. These processes are called secondary recovery. Tertiary or enhanced recovery may involve pumping steam into the well to heat and thin the heavy oil. (1-2)

refinery - An industrial plant that manufactures finished products from crude oil, natural gas, natural gas liquids, other hydrocarbons, and oxygenates. (1-2)

reformulated gasoline - Gasoline whose composition includes oxygenates and reduced content of olefins, aromatics, volatile components, and heavy hydrocarbons. The goal is to reduce ozone formation and the release of toxic substances into the air from both evaporation and tailpipe emissions. In cities that do not meet air-quality requirements for ozone set forth in the 1990 amendments to the federal Clean Air Act, only reformulated gasoline can be sold during months when ozone pollution is most serious. (2-2)

refuse - Trash. (2-2)

renewable fuel - Fuel that is created naturally, or by human intervention at a relatively rapid rate, and therefore does not run out. (1-2)

reserves - Identified deposits or reservoirs of natural resources, such as coal, forests, or water. (1-2)

reservoir - A place where something is kept in storage such as water behind a dam or oil between impermeable rock layers. (1-2, 1-3)

residual oil - Oil products that remain after the distillation of petroleum, used in adhesive, roofing compounds, and asphalt. (2-3)

resistance - As applied to electricity, the opposition of a body or substance to current passing through it, resulting in a change of electrical energy into heat or another form of energy. (3-1)

resource - In general, anything necessary to produce something. Examples are natural resources such as water and human resources such as skills. Can also refer to suspected but unidentified deposits of natural resources, usually ones hidden underground. (1-2, 1-3)

retail network - As part of a fueling infrastructure, a system of retail outlets where fuels are sold to individual customers. (2-4)

APPENDICES

GLOSSARY



retrofit - To furnish with new parts or equipment after manufacture. (2-4)

rotary engine - An engine in which the pistons rotate around a stationary crankshaft. (3-2)

S

satire - Sarcasm or caustic wit used to attack or expose folly, vice, or stupidity. (2-4)

secondary energy source - An energy source transformed from a primary source. (4)

sediment - Fine particles of minerals and organic material that drift in the air, wash down rivers and streams, and settle to the bottom of bodies of water. (1-2)

seep - A fissure in the earth's surface where crude petroleum is emerging slowly. (1-2)

services - Underground pipes that connect with natural gas mains and deliver the product to the consumer. (1-2)

simple hydrocarbon - A hydrocarbon whose molecular structure contains four or fewer carbon atoms. These tend to burn more completely and emit fewer pollutants than more complex hydrocarbons. (4-1)

sinusitis - Inflammation in one or more of the cavities of the skull. (4-4)

slow fill - A method of CNG fueling in which the gas is compressed as it is dispensed into the vehicle's fuel tank. (pg. 418)

smog - A brownish haze seen over polluted cities. The name was coined as a combination of "smoke" and "fog," both of which it resembles. A principal component is ozone. (4-2)

smorgasbord - Literally, a buffet offering a variety of foods; figuratively, a term applied to a mixture of many different kinds of things. (4-2)

solar collector - A device that collects solar energy and converts it to heat energy. (1-3)

solar energy - Usable energy derived directly from sunlight. Solar energy is captured using technologies such as photovoltaic cells, solar thermal systems, and passive and active solar construction. (1-3)

solar pond - A large, shallow, human-made body of salt water that captures the sun's heat energy. (1-3)



APPENDICES

GLOSSARY

solar reflector - A panel that uses mirrored surfaces to concentrate sunlight onto a receiver that superheats a liquid. The liquid turns to steam, which spins a turbine. (1-3)

Southwest Research Institute - The largest independent, nonprofit, applied research and development organization in the United States, founded in 1947 to provide services to industrial and government clients. SwRI headquarters are in San Antonio, with branch offices in Houston, Detroit, and Washington. (p. 406)

spark plug - A device that screws into the cylinder head of an engine and provides an electrical spark to ignite the compressed air-fuel mixture in the combustion chamber. (3-2)

stereotype - In an editorial cartoon, use of physical features or language commonly believed to be typical of a group. (2-4)

storage zone - The bottom layer of a solar pond. This layer is heated by sunlight to 70-100°C and is very salty. (1-3)

stratosphere - The region of the upper atmosphere extending from the troposphere (8 miles altitude) up to about 30 miles. (4-1)

stratospheric ozone - See *ozone layer*. (4-1)

structural formula - Also known as molecular structural formula. A diagram that shows the arrangement of atoms and their bonds in a molecule. (2-1)

sulfur - A non-metallic element of lemon-yellow color, sometimes known as "brimstone." A contaminant in some hydrocarbon fuels, especially diesel, that can result in harmful sulfur dioxide gases in the atmosphere. (4-1)

superconductivity - The flow of electric current without resistance through certain metals, alloys, and ceramics at temperatures near absolute zero. (3-1)

surface zone - The top layer of a solar pond. This layer is cold and contains little salt. (1-3)

symbolism - In an editorial cartoon, the use of standard symbols, pictures, or metaphors that help express the artist's meaning, e.g., Uncle Sam. (2-4)

syngas - See *synthesis gas*. (2-2)

synthesis gas - Also called syngas. A gaseous fuel produced from biomass or reformed from natural gas, composed primarily of carbon monoxide and hydrogen. (3-3)

APPENDICES

GLOSSARY



T

target audience - The group of people to whom an advertising campaign is directed. (2-4)

Texas Department of Transportation - The state agency responsible for building and maintaining state highways and roads, assisting public transportation and aviation programs, promoting highway safety, administering vehicle titling and registration, providing travel services, and other transportation-related activities. (2-4, p. 405)

Texas Natural Resource Conservation Commission - The state agency responsible for ensuring clean air, an adequate supply of clean water, and proper and safe disposal of various forms of pollutants, consistent with sustainable economic development. (4-1, pp. 405, 406)

Texas Railroad Commission - The state agency that oversees safety of railroads, gaseous fuels equipment, and pipelines; regulates the state's petroleum, natural gas, and coal industries; and promotes research and education about alternative fuels. (1-2, p. 406)

thermal energy - Also known as heat energy; the energy of moving or vibrating molecules. (1-1)

thermochemical conversion - The use of heat and heat-associated chemical phenomena to change organic substances, such as the conversion of wood into methanol. 2-2)

thermodynamics - A branch of physics that deals with the mechanical action or relations of heat. (2-3, 3-1)

thermosphere - The part of the atmosphere, between the mesosphere and exosphere, where temperatures increase steadily with altitude. (4-1)

tidal dam - A barrier constructed to capture water at high tide so it may be used to generate hydropower. (1-3)

tide - The periodic variation in the surface level of the oceans, bays, gulfs, inlets, and estuaries, caused by gravitational attraction of the moon and sun. (1-3)

topography - The natural or man-made features of a landscape. (4-1)

toxic - Poisonous or harmful to human life. (4-4)

trachea - Respiratory tube extending from the larynx to the bronchi. (4-4)

transesterification - A chemical conversion in which organically derived oils and fats are combined with alcohol (ethanol or methanol) in the presence of a catalyst to form esters. (2-2, 2-3)



APPENDICES

GLOSSARY

transformer - A device used to transfer electrical energy from one circuit to another with a change in voltage or other electric characteristic. (1-3)

troposphere - The lowest region of the earth's atmosphere. The top of the troposphere varies in altitude from 5 miles at the poles to 11 miles at the equator. (4-1)

turbine - Any of various machines that convert the kinetic energy of a moving liquid or gas to mechanical power through the use of buckets, paddles, or blades. (1-3)

U

ultraviolet - Of or relating to the range of invisible radiation wavelengths from just beyond the violet region of the visible spectrum to the X-ray region. (1-1)

uranium - A heavy, silvery-white metallic element. Uranium is radioactive and toxic. It is most commonly used in research, nuclear fuels, and nuclear weapons. (1-1, 2-2)

useful life - How long a product will continue to function adequately with minor maintenance and repair. (2-4)

V

vapor lock - A pocket of vaporized gasoline that obstructs the normal flow of fuel in the fuel line of an internal-combustion engine. (2-2)

visible light - Electromagnetic radiation that is visible to the human eye. (1-1)

volatile - Describes a substance that readily turns to vapor at normal temperatures and pressures. (4-1, 4-2)

volatile organic compounds - Carbon-based emissions, released through evaporation or combustion (as in an automobile engine), that combine with nitrogen oxides in the presence of sunlight to form ozone, the principal component of smog. (4-1)

volatility - The tendency of a solid or liquid to pass into the vapor state at a given temperature. The volatility of automotive fuels is measured as Reid vapor pressure. (2-2)

APPENDICES

GLOSSARY



volt - The metric unit of electric potential and electromotive force. (1-3)

voltage - Electric potential; electromotive force. (1-3)

W

waste-to-energy plant - A facility that, under particular government regulations, processes waste to produce energy. (2-2)

watt - The International System of Units' unit of power, equal to one joule per second. In the case of electrical power, the number of watts is equal to the current in amperes multiplied by the electrical potential in volts. (3-1)

wavelength - The distance between one peak or crest of a wave and the next. (1-1)

well - A deep hole or shaft sunk into the earth to obtain water, oil, gas, or brine. (1-2)

windmill - A machine that captures wind energy by using a wheel of rotating blades or sails. (1-3)

wood alcohol - See *methanol*. (2-3)

work - A change in the position, speed, state, or form of matter. Also, the energy expended when an object's speed is increased or when it moves against an opposing force. The amount of work done is calculated by multiplying the force exerted on an object by the distance through which the object is moved (as long as the force is constant and motion is in a straight line in the direction of the force). (1-1, 3-1)

X

X-ray - A stream of high-energy particles, used for their penetrating power in radiography, radiology, and scientific research. (1-1)